

Paint Gun Cleaning Solvent Recycling



Current Practices

- Thinners and organic solvents provide effective cleaning
- Acetone and Methyl acetate blends
 - exempt VOCs, not regulated by air districts
 - less toxic than other organic solvents
- Manual cleaning
- Automatic equipment
- Combination manual/auto

Solvent Use Concerns

- Largest hazardous waste stream – mixture of waste gun cleaning solvent and waste paint
- Worker health and safety and environment
 - Toxic – toluene, xylene
 - Flammable
 - Smog forming Volatile Organic Compounds
- Recordkeeping requirements
- Solvent cost
 - Solvent loss from evaporation increases product cost

P2 Strategies

- 2-stage cleaning
- Enclosed automatic equipment
- Disposable cup liners
- Alternative technology cleaning systems
- Waterborne coatings
 - water-based cleaners

Solvent Comparison

Cleaning Solvent Comparison	Solvent Type	VOC Regulatory Restrictions	Health Concerns	Manage as Hazardous Waste	Flammable Fire Dept Regulated
Traditional Cleaning Solvents	Organic Solvent and Lacquer Thinner	yes	yes	yes	yes
EPA Exempt Solvents *If exemption has been adopted in specific air district	Acetone	no	yes	yes	yes
	Acetone and methyl acetate blend	no	yes	yes	yes
	PCBTF* (Parachlorobenzotrifluoride)	no	unknown	yes	yes
	TBAC* (Tertiary-Butyl acetate)	no	yes	yes	yes
Pollution Prevention (P2) Alternatives	Citrus based	yes	no	filter waste	yes
	Aqueous based	yes	no	filter waste	no

Two-stage cleaning

- Empty paint pot thoroughly
- First stage uses dirty solvent
 - remove most of paint
 - paint cup requires most cleaning
- Second stage uses clean solvent
 - flush out spray gun
 - remove remaining paint
- Replace 1st stage solvent with 2nd stage, when it stops cleaning effectively
- Conserves solvent, saves money

Enclosed Automatic Cleaning

- Solvent is forced through spray gun
- Minimizes solvent loss during cleaning
- Reduces worker exposure
- Filtration system
 - extends solvent life



Calibrated Paint Cup Liners

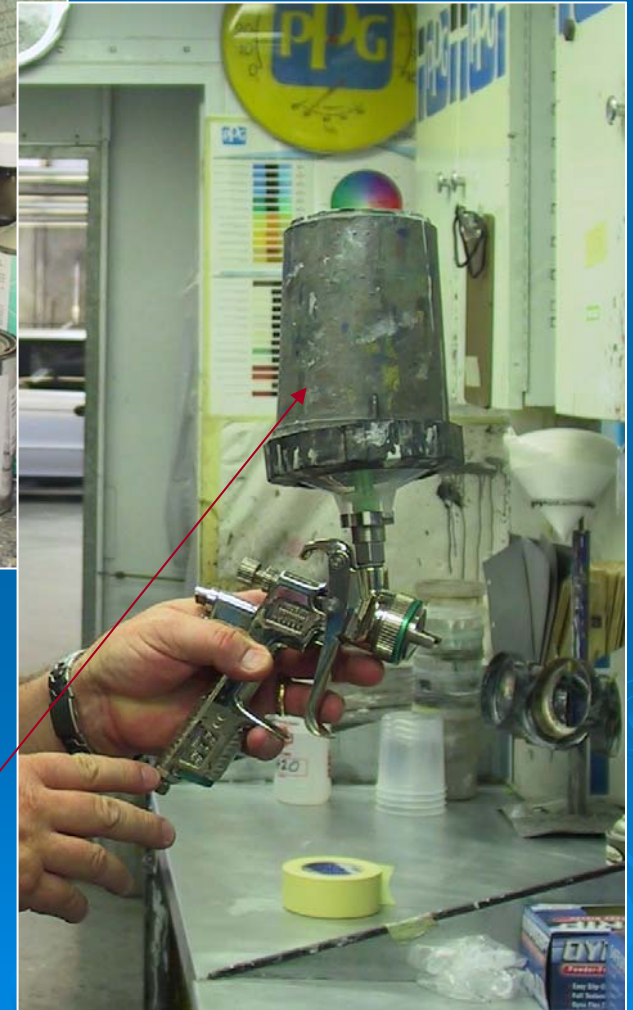
- Eliminates most cleaning- paint cup
- Disposable
 - Stores left-over paint
 - Clean in water based system for limited reuse





Gravity feed spray guns

Spray gun and disposable
cup liner system



Alternative Paint Gun Cleaning Systems



Alternative Cleaning Systems

- Water-based
 - Used in automotive refinishing shops
- Citrus-based (d-limonene)
 - Used for military vehicle & equipment painting
- Cleaning solution features
 - low toxicity
 - low vapor pressure
 - **contain regulated VOCs**
- Paint solids are removed from cleaning solution by circulating solution through filters

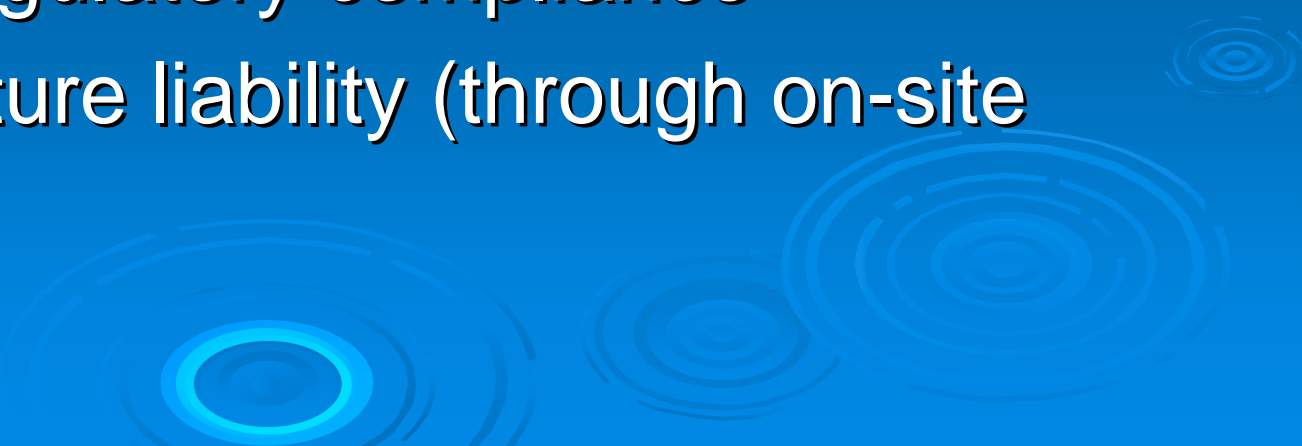


Alternative Paint Gun Cleaner – Citrus Based Solution

Solvent Recycler/Distillation Units



Why Recycle Solvent?

- Protect the environment
 - Primary source of hazardous waste
 - Major contributor to air and water pollution
 - Reduce time and money spent on managing hazardous waste
 - Achieve regulatory compliance
 - Reduce future liability (through on-site recycling)
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Solvent Recycling Options

➤ On-Site Recycling

- Recover spent solvent using shop owned equipment

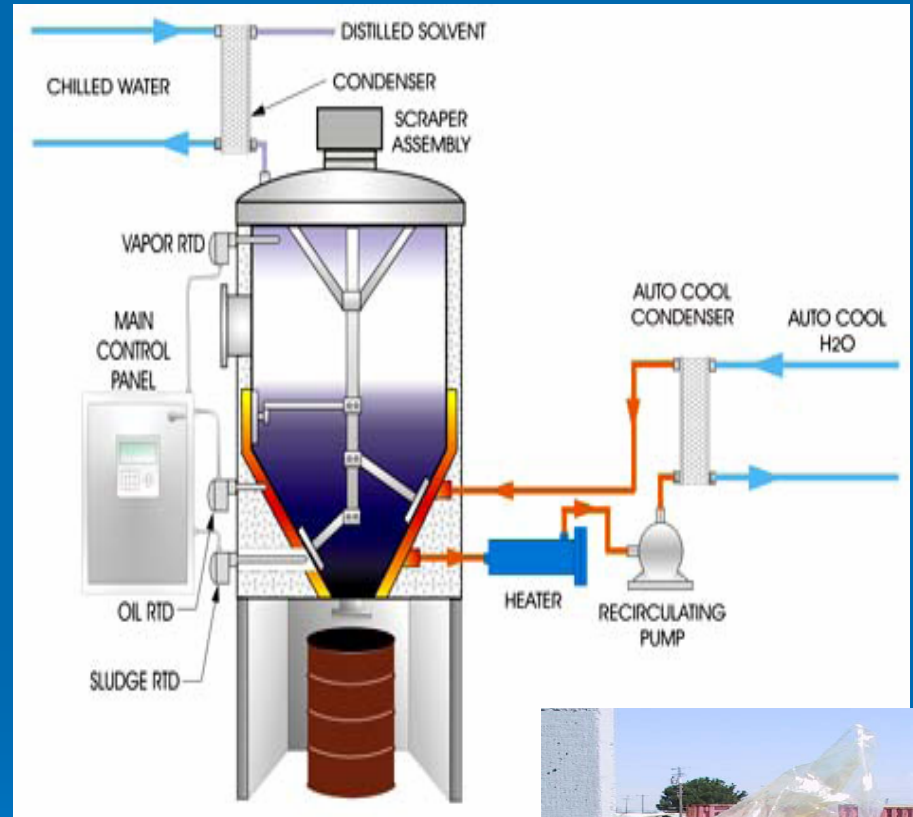
➤ Off-Site Recycling

- Recover spent solvent through use of an outside recycling facility



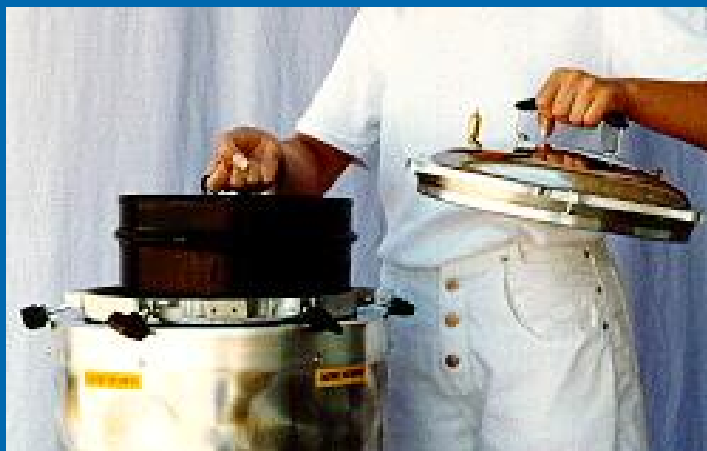
How Solvent Recycling Works

- Typical solvent recycling is accomplished by a distillation process that includes the following steps:
- Waste solution is poured into a charged still (distillation) vessel
 - A thermal oil jacket heats the waste solution until the solvent boils into vapor
 - The vapor passes through the condenser where it is collected and cooled back into a liquid solvent
 - The still bottoms, waste remaining at the bottom of the still, is disposed of as hazardous waste



Simple Distillation Unit: Sidewinder

(1) Load



(3) Push to start



(2) Latch on lid



(4) Recycled Solvent






Distillation unit



Still bottoms

On-Site Vs. Off-Site Recycling

Consider the following when evaluating recycling options:

- Cost
 - Recycled product quality
 - Hazardous waste storage, handling, and disposal concerns
 - Fire and electrical safety concerns
 - Regulatory concerns
 - End use concerns
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Off-Site Vs. On-Site Recycling: Cost

➤ On-Site Solvent Distillation

- \$2,500 to \$6,000 capital cost, equipment
- \$3,400 per year, O&M and HW disposal

➤ Cost comparison calculator

http://p2library.nfesc.navy.mil/P2_Opportunity_Handbook/8_I_4.html

<http://p2library.nfesc.navy.mil/econs/8i4.xls>

On-Site Vs. Off-Site Recycling: Recycled Product Quality

➤ On-Site Solvent Distillation

- Mixture of cleaning solvent and paint reducers depends on input

➤ Off-Site Solvent Recycling Service

- Recycled or virgin product, known composition



Hazardous Waste Storage, Handling, and Disposal Concerns

➤ On-Site Solvent Distillation

- Owner responsibility
 - Proper management of waste solvent, reclaimed solvent, and still bottoms

➤ Off-Site Solvent Recycling Service

- Owner responsibility
 - proper waste handling and storage
 - use a licensed hazardous waste transporter
 - ship to a facility permitted to treat the waste

On-Site Vs. Off-Site Recycling: Fire and Electrical Safety Concerns

➤ On-Site Solvent Distillation

- Distillation unit heats flammable solvent creating potential hazard

➤ Off-Site Solvent Recycling Service

- Safe storage on-site until picked up



On-Site Vs. Off-Site Recycling: Regulatory Concerns

➤ On-Site Solvent Distillation

- Reclaimed solvents may exceed air district limits on VOC content in gun cleaning solvents.
- Some local CUPAs and Fire Departments may not allow the use of on-site recyclers.

➤ Off-Site Solvent Recycling Service

- Off-site recyclers are responsible for all necessary permits and maintaining regulatory compliance at their facility
- Generator responsibility: check transporter registration & facility permit

On-Site Vs. Off-Site Recycling End Use Concerns

➤ On-Site Solvent Distillation

- Use recycled product for spray gun cleaning.
- Recycled solvent that is not used on-site is subject to hazardous waste regulations.

➤ Off-Site Solvent Recycling Service

- Some off-site facilities create fuel instead of cleaning solvent as an end product.
- Look for a service that produces recycled cleaning solvent.

On-Site vs. Off-Site Recycling Summary

➤ On-Site Solvent Distillation

- Advantages:
 - cost effective, compared to off-site recycling cost
 - inventory and storage reduction
 - reduces long term liability from off-site treatment and disposal

➤ Off-Site Solvent Recycling Service

- May be most cost effective option if:
 - small waste stream, or
 - solvent waste is not routinely generated
- Advantage: using reclaimed rather than virgin solvents
- Disadvantages:
 - service and transportation costs
 - off-site transportation, treatment and disposal liability